NOAA's Product Processing from MetOp Satellites

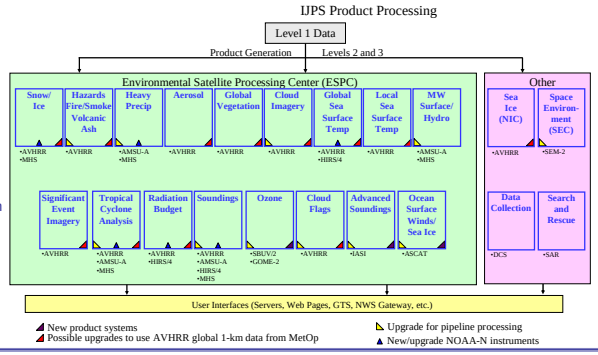
Tom Schott
NESDIS/OSD
Tom.Schott@noaa.gov

Stacy Bunin
Mitretek Systems
sbunin@mitretek.org

NOAA and EUMETSAT have a partnership to cooperate in providing meteorological data from their polar-orbiting satellites. As part of the Initial Joint Polar-orbiting Satellite System (IJPS), NOAA and EUMETSAT collect and exchange environmental data and distribute it to users.

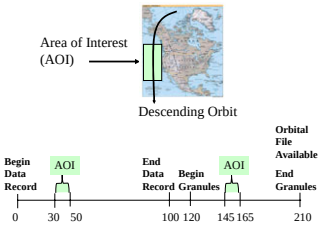
NOAA will generate new and improved products from MetOp and will take advantage of technologies that allow for faster data processing. MetOp will provide the continuity of mission from the current NOAA morning satellite (9:30 AM) orbit while the POES satellites maintain the afternoon (2:00 PM) orbit.

NOAA product processing systems required changes because of MetOp. These included upgrades for pipeline processing, possible upgrades for using MetOp's AVHRR 1-km global data, and new product systems that will use MetOp's new instrument data.



Pipeline Processing

During IJPS, MetOp data and POES blind orbits will be delivered in pipeline mode to NOAA from EUMETSAT. Data is delivered in a constant flow as opposed to the current "burst" delivery method. Several product processing systems will be updated to accommodate the pipeline format and continue to meet user timeliness requirements.

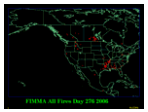


AOI product generation begins ~45 minutes sooner in pipeline vs orbital processing

Fire Analysis

The Fire Identification, Mapping and Monitoring Algorithm (FIMMA) is an automated algorithm to detect fires from AVHRR data. It is one algorithm integrated by analysts to produce a quality controlled display of the locations of fires and significant smoke plumes. Fire products are available as one of the layers on the Hazard Mapping System in GIS format.

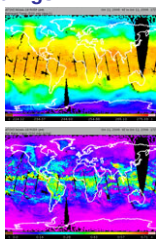
AVHRR data from the NOAA satellites are available orbitally in near-realtime, typically 3-6 hours after satellite overpass. Pipeline processing will give the analysts time-critical fire data on a much quicker basis.



Fire algorithms from AVHRR data will use pipeline processing. The top image shows the FIMMA product with analyzed smoke in a GIS format and the bottom image shows all fires using the FIMMA algorithm for a particular day.

Atmospheric Temperature and Moisture Soundings

Pipeline processing of MetOp data is necessary to ensure timeliness requirements are met and to continue the morning mission's temperature and moisture soundings used for numerical modeling, climate monitoring, and forecasting applications.

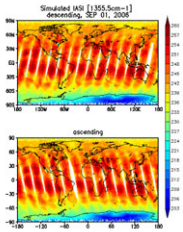


ATOVS temperature and moisture soundings will be generated in pipeline mode to meet user timeliness requirements.

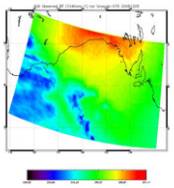
New MetOp Instruments

IASI

IASI will provide highly accurate atmospheric temperature and moisture information for assimilation into numerical weather models. This data will be available to NWS field offices and Department of Defense to support weather forecasting and warning mission areas. Products will include thinned radiances, principal component scores, cloud cleared radiances, carbon products (Carbon Dioxide, Carbon Monoxide, and Methane), temperature, moisture, and ozone profiles.



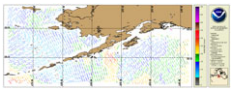
IASI Simulated Global Grids
Simulated Brightness Temperature (frequency 1355.5cm-1, upper troposphere water vapor and CH4 channel)



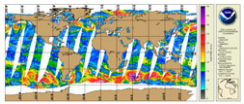
IASI Simulated Granule Data
Simulated Brightness Temperature (frequency 1040cm-1, ozone channel) for Granule 15

ASCAT

ASCAT will be used to generate wind vectors at 25-km and 12.5-km resolution, as well as a daily ice product. These products are assimilated into NWP models and are also used by NWS field offices.



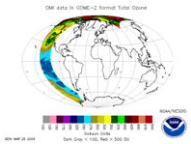
QuikSCAT wind vectors for Alaska. Similar regional products will be generated from ASCAT.



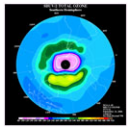
Global QuikSCAT wind speed. A similar product will be generated from ASCAT.

GOME-2

GOME-2 will be used to generate total ozone and ozone profiles and will replace the morning orbit SBUV/2 ozone products. The GOME-2 ozone product is similar to the SBUV/2 total ozone, but has better coverage. These products will be used in environmental modeling, as well as to monitor the ozone hole and ozone trends. Future product plans from GOME-2 include the generation of trace gases such as nitrogen dioxide, sulfur dioxide, and formaldehyde, and aerosol products that will provide the ability to distinguish between dust/smoke and urban/industrial aerosols.



OMI data in GOME-2 format

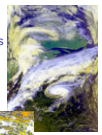


SBUV/2 Total Ozone for the southern hemisphere. Similar products will be generated for each hemisphere from GOME-2.

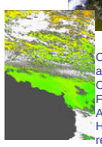
Global AVHRR 1-km Products

Cloud Products

The Clouds from AVHRR (CLAVR-x) processing system provides operational cloud mask, cloud type, and surface type values. The pixel level cloud mask gives information on sky cover, such as clear, cloudy, partly clear, or partly cloudy. These products are currently generated from NOAA's 4-km global AVHRR data and 1-km local data and will be improved from the use of MetOp's 1-km global data.



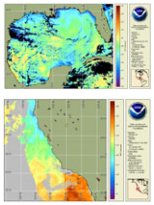
CLAVR-x 1-km product from Wallops Island, VA HRPT receiving station



Cloud Mask and Clear SST Cape Ferguson (CF), Australia HRPT receiving station

Sea Surface Temperature

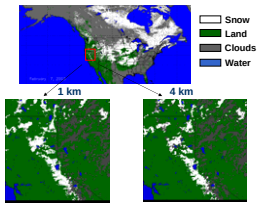
Sea Surface Temperature product resolution will be improved by up to a factor of 8 for a variety of users with the use of MetOp's 1-km global AVHRR data. The CoastWatch/ OceanWatch program will use the data to provide higher resolution SSTs over the expanded OceanWatch areas. Coral Reef Watch will use the high-resolution SSTs for a more accurate assessment of coral reef heat stress and prediction of bleaching events. Other applications include assimilation into operational forecast models, more accurate location of critical temperature fronts and eddies, and estimates of survival time for search and rescue missions.



CoastWatch SST areas are being expanded to cover the world's oceans (OceanWatch) in part by using MetOp's 1-km global AVHRR data.

Snow Cover

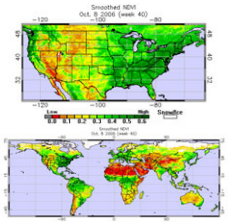
Snow cover boundary conditions will be improved for numerical weather prediction models. Accuracy is important for forecasting surface temperature and humidity as well as in hydrological applications. Automated snow maps will use MetOp's global 1-km data and are one of the input layers to the Interactive Multisensor Snow and Ice Mapping System.



Snow cover is shown at 1-km versus 4-km resolution.

Vegetation

Improved vegetation products will provide more accurate surface conditions for numerical weather prediction models. They are also helpful for drought monitoring and determining fire risk.



Vegetation products include the Normalized Difference Vegetation Index, which is available globally and regionally.